

Research and Practice Innovations

Health Professionals' and Dietetics Practitioners' Perceived Effectiveness of Fruit and Vegetable Parenting Practices across Six Countries

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ABSTRACT

Fruit and vegetable intake may reduce the risk of some chronic diseases. However, many children consume less-than-recommended amounts of fruit and vegetables. Because health professionals and dietetics practitioners often work with parents to increase children's fruit and vegetable intake, assessing their opinions about the effectiveness of parenting practices is an important step in understanding how to promote fruit and vegetable intake among preschool-aged children. Using a cross-sectional design, collaborators from six countries distributed an Internet survey to health and nutrition organization

members. A self-selected sample reported their perceptions of the effectiveness of 39 parenting practices intended to promote fruit and vegetable consumption in preschool-aged children from May 18, 2008, to September 16, 2008. A total of 889 participants (55% United States, 22.6% Mexico, 10.9% Australia, 4.4% Spain, 3.3% Chile, 2.2% United Kingdom, and 1.6% other countries) completed the survey. The fruit and vegetable intake-related parenting practices items were categorized into three dimensions (structure, responsiveness, and control) based on a parenting theory conceptual framework and dichotomized as effective/ineffective based on professional perceptions. The theoretically derived factor structures for effective and ineffective parenting practices were evaluated using separate confirmatory factor analyses and demonstrated acceptable fit. Fruit and vegetable intake-related parenting practices that provide external control were perceived as ineffective or counterproductive, whereas fruit and vegetable intake-related parenting practices that provided structure, nondirective control, and were responsive were perceived as effective in getting preschool-aged children to consume fruit and vegetables. Future research needs to develop and validate a parent-reported measure of these fruit and vegetable intake-related parenting practices and to empirically evaluate the effect of parental use of the parenting practices on child fruit and vegetable consumption.

J Am Diet Assoc. 2010;110:1065-1071.

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Manuscript accepted: December 4, 2009.

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0002-8223/\$36.00

doi: 10.1016/j.jada.2010.04.003

American children often consume less than the recommended amount of fruit and vegetable servings per day (1). Similar trends have been detected in Australia (2), Europe (3), Mexico (4), and worldwide (5). Since diets high in fruit and vegetables reduce the risk of cardiovascular disease (6), diabetes (7), some cancers (8), and perhaps obesity (9), emphasis has been placed on the need for health professionals, including dietetics practitioners, to counsel children and families to consume recommended amounts of fruit and vegetables (10).

Parenting affects child eating behaviors (11). Some parenting practices have been associated with greater child consumption of fruit and vegetables (12,13), but overly controlling parenting practices were associated with lower fruit and vegetable consumption among children (14,15). Based on the general parenting literature, a multidimensional approach to food parenting has been proposed (16) that includes types of control used by parents,

parental responsiveness to the child in the eating context, and the structure parents create in the child's eating environment. Some of these practices are likely effective and others ineffective in getting children to eat fruit and vegetables.

Although multiple food-related parenting practices and feeding style measures exist (17-20), few elucidate which parenting practices should be promoted to best encourage child fruit and vegetable consumption. Research has focused on food parenting practices found to be ineffective or counterproductive. For example, overly controlling food parenting practices have been linked to lower self-regulation in eating and higher weight status among children in several studies (21,22). Because of their clinical experience in counseling families regarding child feeding strategies and their knowledge and interpretation of existing research evidence, health professionals and dietetics practitioners regularly provide advice to parents regarding how to best encourage children to eat fruit and vegetables. Health professionals' and dietetics practitioners' perceptions of the effects of fruit and vegetable intake-related parenting practices provide insight into the current clinical beliefs on fruit and vegetable intake-related parenting practices. The objective of this study was to assess health professionals' and dietetic practitioners' perceptions regarding the effectiveness, or lack thereof, of parenting practices intended to promote fruit and vegetable intake in preschool-aged children. A large international sample of professionals from different countries and training backgrounds who provide health care (eg, physicians, registered nurses, and nurse practitioners) or nutrition counseling (eg, registered dietitians) was sought.

METHODS

To assess health professionals' and dietetics practitioners' perceptions regarding the effectiveness of parenting practices intended to promote fruit and vegetable intake in preschool-aged children, collaborations were sought among researchers known to the study group to be involved in childhood nutrition or obesity prevention in nine English- and Spanish-speaking countries. These collaborators were asked to reach health professional and dietetics practitioner organizations within their country to distribute an Internet survey for the cross-sectional study. Six researchers (67%) agreed to collaborate; however, one was unable to distribute the survey and was therefore not listed as a collaborator, but the one response from that researcher was included as a participant from an 'other' country. Thus, five countries are represented in the cross-sectional study: Australia, Chile, Mexico, Spain, and the United Kingdom. The survey was reviewed by the country collaborators before distribution to ensure readability and comprehension across cultures.

After appropriate organization permissions were obtained when required, invitations to participate in the online survey were distributed to professionals through several health and dietetics-related professional organization electronic mailing lists or online newsletters within the five countries and the United States. This study was approved by the Institutional Review Board of Baylor College of Medicine and was performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki. The National Association of Pe-

diatric Nurse Practitioners' (United States) and Department of Education and Early Childhood Development (Australia) research committees independently reviewed and approved the survey before providing access to their organization's members. The survey was available online from May 18, 2008, to September 16, 2008, in both English and Spanish.

After providing online consent to participate, professionals were asked to respond how effective was each of 39 parenting practices in getting 3- to 5-year-old children to eat fruit and vegetables in the short term (ie, this meal), whether the practice would have an enduring effect (ie, throughout childhood) on fruit and vegetable consumption, and whether the practice could be harmful to the psychological or physical development of a child. Each question had to be answered to move onto the next screen, with a choice to opt out of responding. The fruit and vegetable intake-related parenting practices considered for the Internet survey were from items generated from structured focus groups with parents of Head Start preschool children (12) and review of existing food parenting practice scales (17,18). An expert panel reviewed the initial 49 fruit and vegetable intake-related parenting practices, resulting in rewording and elimination of several items. The final 39-item fruit and vegetable intake-related parenting practices survey was translated into Spanish and then back-translated into English to ensure instrument internal validity.

For this analysis, only the results of the long-term effectiveness of practices are reported, with a 5-point response scale: "large enduring effect," "some enduring effect," "no enduring effect," "counterproductive," and "I don't know." The health professionals and dietetics practitioners were also asked to provide demographic information and their experiences in counseling families regarding child feeding.

Statistical Analysis

The frequency of responses for participant descriptors and parenting practice were calculated. If respondents reported having more than one degree or credential, only the degree most representing their profession (eg, MD or RD over master's degree) was reported in this analysis. Using a conceptual framework relating food-related parenting to general parenting theory (16), each item was categorized into one of three food-related parenting constructs (responsiveness, structure, and control) by consensus discussion among three authors. The resulting categorizations were reviewed and agreed upon by the eight US researchers and any differences in opinion were resolved by consensus. The 39 practices were divided into those perceived as effective vs ineffective if at least 50% of the health professionals and dietetics practitioners perceived it as having a long enduring or some enduring effect. The factor structures of the effective and ineffective fruit and vegetable intake-related parenting practices were tested separately using confirmatory factor analysis (CFA), since the effective practices included items from all three theory-based subfactors allowing for a second order model, whereas the ineffective practices included items from one of the theory-based subfactors (first order model). Due to the ordinal nature of the data, the polychoric correlation matrix and asymptotic covari-

Table 1. Characteristics of the health professionals and dietetics practitioners from six countries who were surveyed about their perceptions regarding the effectiveness of fruit and vegetable intake-related parenting practices, and the populations they served (N=889)

Description	n	%
Professional demographic		
Country of residence		
Australia	97	10.9
Chile	29	3.3
Mexico	201	22.6
Spain	39	4.4
United Kingdom	20	2.2
United States	489	55.0
Other	14	1.6
Sex		
Male	48	5.4
Female	839	94.4
No response	2	0.2
Professional degree		
No response	5	0.6
Bachelor of arts/bachelor of science	39	4.4
Doctor of public health/doctor of philosophy	36	4.0
Master's degree	79	8.9
Medical degree	67	7.5
Nurse practitioner	347	39.0
Dietitian/nutritionist	228	25.6
Registered nurse	72	8.1
Other	16	1.8
Typical work related to child feeding^a		
Research	114	12.8
Outpatient clinical	573	64.5
Inpatient clinical	141	15.9
Education	459	51.6
Not applicable	45	5.1
No response	2	0.2
Other	61	6.9
Years of clinical, research, or education experience (combined) in counseling or helping parents in feeding children		
None	45	5.1
<1 y	29	3.3
1-3 y	82	9.2
4-10 y	241	27.1
11-20 y	216	24.3
>20 y	271	30.5
No response	5	0.6
Population served		
Ages of children^a		
<2 y	483	54.3
2-5 y	591	66.5
6-11 y	558	62.8
≥12 y	427	48.0
I do not work with children	106	11.9
No response	20	2.2
Socioeconomic level of families^a		
Low income	515	57.9
Middle income	493	55.5
Upper-middle to upper income	245	27.6
No response	15	1.7

Table 1. (continued)

Description	n	%
Work site^a		
Client's home	47	5.3
Schools	154	17.3
Preschools or daycares	93	10.5
Clinics	537	60.4
Nutrition, education, or supplementation programs utilized	119	13.4
Community program(s)	204	22.9
No response	16	1.8
Other	140	15.7
Typical contact with families regarding child feeding		
Provide services directly to families/children	662	74.5
Staff provides services directly to families/children	165	18.6
Once provides services directly to families/children, but no longer	104	11.7
Never provided services directly to families/children	59	6.6
No response	22	2.5

^aRespondent could check all that apply.

ance matrix in conjunction with the weighted least square error of approximations estimation procedure were used to confirm the factor structure. Model fit was assessed by Hu and Bentler's criteria (23,24). Pearson correlations (r), using $\alpha=.05$ and a two-tailed test, were computed to assess the associations among the composite scores of the effective and ineffective sub-factors. The CFA was conducted using Lisrel (version 8.52, 2003, Scientific Software International Inc, Lincolnwood, IL) with other analyses performed using SPSS (version 16.0.2, 2008, SPSS Inc, Chicago, IL).

RESULTS

A total of 889 health professionals and dietetics practitioners responded to the survey. They represented all participating countries and many professional groups (Table 1). More than half of professionals reported >10 years of clinical, research, or educational experience (combined) in counseling families. The professionals worked with families with children of different ages and socioeconomic backgrounds. The majority of respondents (60.4%) counseled families on child feeding in a clinical setting. However, a variety of other locations were cited, including community programs, schools, and nutrition supplementation programs (eg, The Special Supplemental Nutrition Program for Women Infants and Children).

CFA of Perceived Effective Practices

For the CFA, four participants were excluded due to opting out of responding to one of two items (no. 19 or no. 37) and one additional participant was excluded for opting out to more than half of the items. The excluded professionals were women from the United States ($n=1$) and Mexico ($n=4$) and varied in age. Their reported professions were nurse practitioner ($n=1$), registered dieti-

tian (n=2), doctoral-degree student (n=1), and other (n=1) and worked with children from varied income levels.

Twenty-five fruit and vegetable intake-related parenting practices were perceived as having “some enduring” or a “large enduring” effect on getting children to consume fruit and vegetables in the long term by >50% of the health professionals and dietetics practitioners (corresponding to an item mean >2 in Table 2). Seventy percent or more of the professionals also reported they perceived these practices as not harmful to a child’s long-term psychological or physical development in a separate question (data not shown). Based on the general parenting conceptual dimensions, five of the items were classified as responsive to a child, 16 as providing structure, and four as providing control that was nondirective.

With no modifications, the CFA fit indexes for the second order model of the parenting practices perceived as effective (Table 2) were mostly in the range of acceptable fit ($\chi^2=936.75$, degrees of freedom [df]=272, $P<0.0001$; root mean square error of approximation [RMSEA]=0.053; non-normed fit index [NNFI]=0.86; comparative fit index [CFI]=0.87; and goodness of fit index [GFI]=0.97). Although modifying the model with a few correlated errors improved the fit indexes slightly ($\chi^2=783.80$, df=267, $P<0.0001$; RMSEA=0.047; NNFI=0.89; CFI=0.90; GFI=0.97), the minor improvement in fit indexes did not warrant the additional model constraints. Internal consistency reliability was acceptable for responsiveness (Cronbach’s $\alpha=.63$, second order standard loading=0.89), structure (Cronbach’s $\alpha=.77$, second order standard loading=0.99), and nondirective control (Cronbach’s $\alpha=.67$, second order standard loading=0.97).

CFA of Perceived Ineffective Practices

Fourteen of the fruit and vegetable intake-related practices were perceived as ineffective or counterproductive for getting children to consume fruit and vegetables in the long term by 50% or more of the health professionals and dietetics practitioners (corresponds to an item mean of ≤ 2 in Table 2). All of these practices were also rated as somewhat or very harmful in a separate question by 50% or more of the professionals (data not shown). Thirteen of 14 ineffective practices had been classified as providing external control to get a child to eat fruit and vegetables. The remaining ineffective item was classified as inappropriate modeling and fell into the structure dimension (no. 9: Tell your child to eat fruit and vegetables, but not eat any yourself) and was therefore excluded from the CFA. The CFA model fit indexes with no modifications indicated acceptable fit of the factor structure ($\chi^2=293.34$, df=54, $P<0.0001$; RMSEA=0.071; NNFI=0.92; CFI=0.94; GFI=0.98). One item was deleted due to lack of fit with the main factor (no. 24: Physically struggle with your child to get him or her to eat fruit or vegetables). The resulting list of 12 external control items had a good internal consistency (Cronbach’s $\alpha=.80$). The factor loadings of individual item are reported in Table 3.

Factor Correlations

Because parents do not use any of these parenting practices in isolation and there is variability among health

professionals and dietetics practitioners in their perceived effectiveness, the correlations among the factors were evaluated. All three of the factors perceived as effective had significant intercorrelations. Structure and nondirective control had the highest correlation ($r=0.613$, $P<0.001$), followed by structure and responsiveness ($r=0.535$, $P<0.01$) and responsiveness and nondirective control ($r=0.389$, $P<0.01$). External control was correlated with responsiveness ($r=0.383$, $P<0.01$) and structure ($r=0.201$, $P<0.01$), but not nondirective control (Table 3).

DISCUSSION

Health professionals and dietetics practitioners have an important opportunity to counsel parents of preschool-aged children regarding which parenting practices intended to encourage fruit and vegetable consumption among children are effective and which are ineffective. To understand the type of advice and counseling provided by professionals, their perception of the effectiveness of fruit and vegetable intake-related parenting practices was assessed. This study demonstrated that there was substantial agreement among the health professionals and dietetics practitioners from several countries over which parenting practices are effective and which are ineffective or even counterproductive in getting children to eat fruit and vegetables in the long term. The parenting practices perceived to be effective included those that provided structure, were responsive, and used nondirective controlling practices to encourage children to eat fruit and vegetables. All the parenting practices that provided external control were perceived as ineffective or counterproductive practices. These findings support a theory-derived food parenting framework (16) in which parenting practices that were responsive to a child, provided structure, and used nondirective control helped create proactive environments in which parents’ attempts to get their children to eat fruit and vegetables were more likely to be effective. In contrast, parenting practices that used external control may be more reactive to a child’s behavior (eg, by restricting intake of available foods, pressuring them to eat more, punishing them to achieve behaviors, and using contingency management approaches), and ultimately were believed to be less effective in the long run.

Previous research supports the premise that externally controlling parenting practices may have negative consequences. Both controlling parent behaviors (14) and pressure to eat (15), a specific type of external control, were associated with lower fruit and vegetable consumption among children. Parental feeding restriction has been positively associated with child energy intake and weight status (25). Alternatively, mealtime overt control (control that can be detected by a child, such as firm expectations about child consumption) and mealtime covert control (control that cannot be detected by children, such as making unhealthful snack foods less available in the home) were associated with greater fruit and vegetable intake in children (26). However, only covert control over snacks predicted a lower intake of unhealthful snacks by the children (26). In our study, an international sample of health professionals and dietetics practitioners perceived these externally controlling practices as ineffective or counterproductive in getting children to eat fruit and vegetables throughout childhood.

Table 2. Survey items and factor loadings from confirmatory factor analyses (CFA) of parenting practices perceived as effective or ineffective^a in getting preschool-aged children to consume fruit and vegetables

Survey item	Mean±standard deviation	Corrected item—total correlation	Standardized loading of CFA
Practices perceived as effective (second order model)^b			
Responsiveness^c			
Praise your child when you see them eat fruit or vegetables	3.2±1.0	0.33	0.67
Encourage your child to try a couple of bites of the fruit or vegetable	3.1±0.9	0.35	0.71
Tell your child that fruit or vegetables taste good	3.0±0.9	0.45	0.79
Tell your child eating fruit or vegetables will make them strong and healthy	3.0±0.9	0.42	0.77
Tell your child that their favorite cartoon characters eat fruit and vegetables	2.2±1.1	0.37	0.53
Structure^d			
Eat together as a family	3.9±0.4	0.35	0.83
Include some form of fruit or vegetable in most meals	3.8±0.4	0.53	0.96
Show your child that you enjoy eating fruit and vegetables	3.8±0.5	0.45	0.88
Use fruit or vegetables for your child's snacks	3.8±0.5	0.48	0.89
Buy fruit or vegetables instead of cookies, chips, and candy	3.6±0.7	0.44	0.89
Give your child fruit or vegetables they like	3.6±0.6	0.24	0.65
Cut back on how often your child eats at fast-food restaurants	3.5±0.8	0.49	0.81
Limit cookies, chips, and candy in your house	3.5±0.7	0.53	0.87
Make fruit and vegetables easy to eat, such as cleaning, cutting, or peeling them	3.4±0.7	0.45	0.76
Offer fruit or vegetables without forcing your child to eat them	3.4±0.8	0.37	0.68
Serve several fruits or vegetables and let your child decide which they will eat	3.4±0.8	0.38	0.70
Make eating fruit and vegetables fun, like cutting into shapes	3.2±0.8	0.30	0.55
Place fruit and vegetables where your child can easily reach them	3.2±0.8	0.32	0.53
Routinely schedule meals for your child	3.1±1.0	0.27	0.56
Mix fruit and vegetables with other foods your child likes	3.0±1.0	0.35	0.50
Ask others not to regularly give your child cookies, chips, or candy	2.6±1.1	0.35	0.55
Nondirective control^e			
Allow your child to serve themselves fruits and vegetables	3.6±0.6	0.49	0.86
Ask your child to select fruit and vegetables at the grocery store	3.5±0.6	0.47	0.83
Ask your child to choose the fruits or vegetables for meals and snacks	3.5±0.7	0.44	0.83
Ask your child to help with fruit or vegetable preparation	3.5±0.7	0.42	0.84
Practices perceived as ineffective (first-order model)^f			
External control^g			
Keep your child from having sweets if they don't finish their vegetables	1.8±1.3	0.43	0.52
Never allow your child to drink sweet drinks	1.7±1.2	0.17	0.87
Promise child something other than food if they finish their fruit or vegetables	1.6±1.3	0.35	0.74
Tell child they will get a stomach-ache if they eat too many cakes, cookies, candies	1.2±1.0	0.38	0.72
Never allow your child to eat cookies, chips, or candy	1.2±1.2	0.43	0.28
Insist your child sit at the table until they eat their fruit or vegetable	1.0±1.2	0.59	0.61
Tell your child how much effort it took to make the fruit or vegetable dish	1.0±0.9	0.42	0.71
Keep your child from going to play if they don't eat their fruit or vegetable	0.9±1.2	0.63	0.84
Beg your child to eat fruit and vegetables	0.8±0.9	0.48	0.88
Reward your child with sweets if they eat their fruit or vegetable	0.7±1.1	0.45	0.95
Make your child feel guilty when they don't eat fruits and vegetables	0.6±1.0	0.60	0.52
Yell at your child for not eating their fruit or vegetable	0.5±1.0	0.61	0.97
Physically struggle with your child to get them to eat fruit or vegetables ^h	0.5±1.0	0.64	
Tell your child to eat fruit and vegetables, but not eat any yourself ^h	0.8±1.1	0.38	

^aModels of parenting practices were analyzed separately. Response categories were counterproductive=0, no enduring effect=1, I do not know=2, some enduring effect=3, and large enduring effect=4.

^b $\chi^2=936.75$, degrees of freedom (df)=272, $P<0.0001$; root mean square error of approximation [RMSEA]=0.053; non-normed fit index [NNFI]=0.86; comparative fit index [CFI]=0.87, and goodness of fit index [GFI]=0.97).

^cCronbach's $\alpha=.63$, second order standard loading=0.89.

^dCronbach's $\alpha=.77$, second order standard loading=0.99.

^eCronbach's $\alpha=.67$, second order standard loading=0.97.

^f $\chi^2=293.34$, df=54, $P<0.0001$; RMSEA=0.071, NNFI=0.92, CFI=0.94, GFI=0.98.

^gCronbach's $\alpha=.80$.

^hItem not included in computation of Cronbach's α or in CFA due to theoretical incongruence or poor factor loading.

Table 3. Pearson correlations (with two-tailed test of composite factor scores, $\alpha=.05$) among health professionals' and dietetics practitioners' perceived effective and ineffective fruit and vegetable intake-related parenting practice subfactors

	Perceived Ineffective	Perceived Effective		
	External control	Responsiveness	Structure	Nondirective control
Perceived ineffective				
External control	1.000			
Perceived effective				
Responsiveness	0.383*	1.000		
Structure	0.201*	0.535*	1.000	
Nondirective control	0.048	0.389*	0.613*	1.000

*Correlation is significant at the $P=0.01$ level.

Parenting practices that provided structure, were responsive, and that used nondirective control were perceived by professionals as effective parenting practices. Parallels can be drawn between Brown and colleagues' (26) covert control and the constructs of food-related parenting structure and nondirective control. In food-related parenting, the construct of structure in part relates to creating home environments that increase the availability and accessibility of fruit and vegetables while decreasing the availability and accessibility of foods that are more energy dense (eg, cookies, chips, and candies) (16). Fruit and vegetable availability and accessibility have been found to be one of the strongest predictors of fruit and vegetable consumption among children (27-29). There is a distinction between restricting access to palatable foods that are available to a child (eg, aware they are in cupboards or in plain sight) and not making them available. Although experimental behavior studies have shown that restricting access to snack foods in plain sight increased children's selection and intake of that food (15), it is possible that creating an environment in which the less-healthy food is not available (ie, not brought into the home) does not have the same counterproductive effects on a child's eating behaviors. Food-related parenting structure also includes other parenting practices that have been associated with children's fruit and vegetable intake, like role modeling (30), and an organized eating environment like family meals (31). Previous work found greater fruit and vegetable consumption among children whose parents used a combination of parenting practices that enhanced availability and accessibility of fruit and vegetables (a type of structure under the existing framework) and teaching moments while avoiding firm discipline compared to parents who were less discriminate in their use of parenting practices or less involved (12).

Our study's limitations include a self-selected sample of health professionals and dietetics practitioners with variable participation within and between countries. Because there was no information collected on nonparticipants, it is not known how participants differ from nonparticipants. However, this self-selected sample may have had a special interest in food-related parenting, which could have influenced their perceptions and, therefore, limits the generalizability to all health and nutrition care providers for pediatric populations. The study only assessed professionals' perceptions of the effectiveness of parenting practices' effectiveness, which does not take

the place of directly assessing the effects of parental use of these parenting practices on preschool-aged children's fruit and vegetable consumption. There was also a lack of items with a potentially ineffective structure (eg, negative role modeling as in item No. 24) and responsiveness factors (eg, emotional feeding), which deserve further study.

CONCLUSIONS

Health professionals and dietetics practitioners from six countries identified 25 of the fruit and vegetable intake-related parenting practices as effective and 14 other fruit and vegetable intake-related parenting practices as ineffective or counterproductive. Parenting practices that created proactive structure for eating fruit and vegetables, were responsive to the child, or used nondirective control strategies to involve the child in choosing or preparing fruits and vegetables were perceived as effective. Parenting practices that exerted external control to get a child to comply were perceived as ineffective. These lists of practices require further research, but can preliminarily be incorporated into clinical training and quality improvement initiatives.

Research on the effects of externally controlling feeding practices has primarily been cross-sectional, which precludes making casual inferences. Future studies need to develop and validate a measure of effective and ineffective fruit and vegetable intake-related parenting practices, evaluate how these parenting practices relate to children's intake of fruit and vegetables over time in diverse populations, evaluate whether these practices are modifiable and whether this change influences child fruit and vegetable intake, and evaluate how health professionals and dietetics practitioners can best counsel parents to use effective fruit and vegetable intake-related parenting practices.

STATEMENT OF POTENTIAL CONFLICT OF INTEREST: No potential conflict of interest was reported by the authors.

FUNDING/SUPPORT: This work is a publication of the US Department of Agriculture (USDA/ARS) Children's Nutrition Research Center, Department of Pediatrics, Baylor College of Medicine, Houston, TX, funded in part by the USDA/ARS (cooperative agreement 6250-51000). The contents of this publication do not necessarily reflect the views or policies of USDA, nor does mention of trade

names, commercial products, or organizations imply endorsement from the US government.

ACKNOWLEDGEMENTS: The authors thank Russell Jago, PhD, at University of Bristol, Exercise, Nutrition, and Health Sciences, Bristol, UK, for contacting professional groups in the United Kingdom; Erick Hodges, PhD, University of North Carolina at Chapel Hill School of Nursing, for contacting nurse practitioner organizations in the United States; and Jennie Fisher, PhD, Temple University College of Health Professions, Philadelphia, PA, for reviewing the parenting practice Internet survey.

The authors also thank the organizations that participated and helped distribute the invitation to participate. US organizations included the Academic Pediatric Association; three electronic mailing lists of the American Dietetic Association (Public Health/Community Nutrition, Clinical Nutrition Management, and Dietetic Technicians in Practice); the National Association of Pediatric Nurse Practitioners; the ARS/USDA Food Nutrition Extension Group; the Texas Hispanic Health Coalition; the Texas African American Health Coalition; and the Texas Association of Local WIC Directors. Australian organizations included the Department of Education and Early Childhood Development-Victorian Maternal Child Health Nurses; the Dietetic Association of Australia; the Public Health Association of Australia-Public Health Nutrition electronic mailing list; the Victorian and the South Australian community dietitian electronic mailing list; and Kids—Go For Your Life Health Professionals Network. In the United Kingdom, the survey was distributed to the UK pediatric dietitian electronic mailing list and the community dietitian electronic mailing list. In Mexico the survey was sent to electronic mailing lists of Iberoamericana University, the Mexican College of Dietitians, the Angeles Mocel Hospital, and the Angeles Clinica Londres Hospital. The organizations in Chile included the Health Ministry-Health Net Hospitals and Clinics; the Institute of Nutrition and Food Technology, Chile University; the National Board of Infant Gardens; and the INTEGRA Foundation. In Spain, the survey was distributed to Health Institute of Catalan, which has a network of hospitals and primary health care centers in Cataluña; and to the National Association of Dietitians of Spain. The survey was also distributed to members of the International Society for Behavioral Nutrition and Physical Activity.

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